

What Is Claimed Is:

1. A sampling apparatus for obtaining samples of liquid product from a vessel, comprising:

a sampler including a body having a longitudinal bore with forward and rearward openings to said bore, an elongate probe in said bore and having a longitudinal passage with a forward inlet to and a rearward sample outlet from said passage, means for opening and closing said probe passage inlet, and means for reciprocating said probe in said bore to extend said probe out of and to retract said probe into said bore forward opening; and

a connecting device for being mounted to the vessel, wherein said sampler is attachable to and detachable from said connecting device and said connecting device is operable between open and closed states to respectively place said sampler into and to take said sampler out of communication with liquid product in the vessel, said sampler being detachable from said connecting device, without escape of liquid product from the vessel, when said connecting device is in said closed state,

said reciprocating means, when said connecting device is in said open state, being operable to extend said probe forward through said sampler body bore forward opening and said connecting device into the vessel to a sampling position of said probe, relative to said body, where said probe passage inlet is in liquid product in the vessel, and to then retract said probe from the vessel and through said connecting device and sampler body bore forward opening, and

said opening and closing means being operable to close said probe passage inlet while said reciprocating means extends said probe forward to said probe sampling position, to open said probe passage inlet while said probe is in said sampling position for flow of a sample of liquid product from the vessel into said probe inlet and through said probe passage to said sample outlet, and to then close said probe inlet while said probe is retracted.

2. A sampling apparatus as in claim 1, wherein said opening and closing means and said reciprocating means are manually operated.

3. A sampling apparatus as in claim 1, wherein said connecting device includes a valve operable between said open and closed states and having a passage that extends between said sampler and the vessel when said valve is in said open state for movement of said sampler probe through said valve passage to said sampling position and that does not extend between said sampler and the vessel when said valve is in said closed state and said probe is retracted from said valve passage.

4. A sampling apparatus as in claim 3, wherein said connecting device valve includes a shell and a ball valve within said shell, and said ball valve has said valve passage extending therethrough and is manually rotatable to said open state where said passage extends between said sampler and the vessel interior and said closed state where said passage does not extend between said sampler and the vessel interior.

5. A sampling apparatus as in claim 1, wherein said connecting device is for being attached to the vessel in communication with an opening to the vessel and said

reciprocating means extends said probe through and retracts said probe from the vessel opening.

6. A sampling apparatus as in claim 1, wherein a rearward end of said probe extends rearward out of said sampler body bore rearward opening and said means for reciprocating said probe in said bore comprises manually movable handle means attached to said probe rearward of said bore rearward opening.

7. A sampling apparatus as in claim 6, including a passage in said handle means extending between said probe sample outlet and a sample discharge port from said handle passage for flow of a sample of liquid product from the vessel into said probe inlet and through said probe passage to and through said probe sample outlet and handle passage to and out of said sample discharge port for collection.

8. A sampling apparatus as in claim 1, including bearing means and seal means in said sampler body bore for supporting said probe for reciprocation in said bore and for sealing said probe to said sampler body.

9. A sampling apparatus as in claim 1, including locking means operable when said probe is extended to its sampling position for releasably locking said probe against retraction through said sampler body bore.

10. A sampling apparatus as in claim 9, wherein said locking means includes slot means in said sampler body and a lock-pin extending from said probe for entry into said slot means when said probe is extended through said body to said sampling position.

11. A sampling apparatus as in claim 1, wherein said probe passage inlet opening and closing means includes an elongate plunger extending through said probe passage, means for manually reciprocating said plunger between forward and rearward positions in said probe passage, and valve means for opening and closing said probe passage inlet in response to said plunger being in respective forward and rearward positions.

12. A sampling apparatus as in claim 11, wherein said probe passage has a rearward opening and said plunger extends rearward out of said rearward opening, and said reciprocating means comprises means toward a rearward end of said plunger for manually reciprocating said plunger in said probe passage.

13. A sampling apparatus as in claim 11, wherein said valve means for opening and closing said probe passage inlet comprises a valve seat on one of said probe and plunger and a valve on the other, said valve and valve seat moving together to close said probe passage inlet when said plunger is reciprocated to its rearward position and said valve and valve seat moving apart to open said probe passage inlet when said plunger is reciprocated to its forward position.

14. A sampling apparatus as in claim 11, wherein said plunger includes a tip extending forward through said probe passage inlet and said tip has a forward end positioned forward from said probe inlet and of a greater diameter than said inlet, and said valve means for opening and closing said probe passage inlet comprises a valve seat formed on said probe at said probe passage inlet and seal means carried by said plunger tip rearward from said tip forward end and forward from said probe valve seat, said seal means moving against said valve seat to close said probe passage inlet

when said plunger is reciprocated to its rearward position and said seal means moving away from said valve seat to open said probe passage inlet when said plunger is reciprocated to its forward position.

15. A sampling apparatus as in claim 11, wherein the sample of liquid product from the vessel flows around said plunger when flowing through said probe passage.

16. A sampling apparatus as in claim 11, including means for supporting said plunger for reciprocation in said probe passage and means for sealing said plunger to said probe to prevent leakage of sampled liquid product out of said probe passage.

17. A sampling apparatus as in claim 14, wherein said plunger is cylindrical and rearward from its forward tip is of a smaller diameter than said probe passage for flow of a liquid product sample through said probe passage and around said plunger.

18. A sampling apparatus as in claim 17, wherein said plunger tip is generally cylindrical and extends through a reduced diameter forward end portion of said probe passage, said plunger tip has an outside diameter that is slightly smaller than the inside diameter of said reduced diameter probe passage portion and said reduced diameter probe passage portion supporting said plunger tip for reciprocation therein, and including at least one longitudinally extending channel in an outer surface of said plunger tip for accommodating a flow of a liquid product sample past said tip and said reduced diameter probe passage portion into said probe passage rearward from said tip.

19. A sampling apparatus as in claim 18, wherein said at least one longitudinally extending channel comprises a plurality of arcuately spaced longitudinally extending channels in said plunger tip outer surface.

20. A sampling apparatus as in claim 1, further including a male and a female coupling, wherein one of said couplings is attached to said sampler body and said connecting device includes the other of said couplings, said couplings being joined together to attach said sampler to said connecting device.

21. A sampling apparatus as in claim 20, including means for releasably locking said couplings together so that said sampler may be securely attached to and detached from said connecting device.

22. A sampling apparatus for obtaining samples of wine from a wine holding tank having an opening toward a lower end of the tank and in which lees forms a sediment layer in the region of the opening, comprising:

a sampler including a body having a longitudinal bore with forward and rearward openings to said bore, an elongate tubular probe extending through said bore and having a longitudinal passage with a forward inlet to, a rearward opening to, and a sample outlet from said passage, said probe having a length greater than that of said body bore, means for manually opening and closing said probe inlet, and means for manually reciprocating said probe in said bore to extend said probe forward out of and to retract said probe rearward into said bore forward opening;

a connecting device for being mounted to the tank in communication with the tank opening, wherein said sampler is attachable to and detachable from said connecting device and said connecting device is operable between open and closed

states to respectively establish a path for reciprocation of said probe forward through said connecting device and the tank opening to a sampling position of said probe relative to said body, where said probe inlet is positioned in wine in the tank and to interrupt said path when said probe is reciprocated rearward out of said connecting device, said sampler being detachable from said connecting device, without escape of wine through the tank opening, when said connecting device is in said closed state,

said means for manually reciprocating, when said connecting device is in said open state, being operable to extend said probe forward through said connecting device, the tank opening and any sediment in the region of the tank opening to said probe sampling position where said probe passage inlet is in wine in the tank beyond any sediment layer, and to then retract said probe from the tank and through the tank opening and said connecting device, and

said means for manually opening and closing being operable to close said probe passage inlet while said reciprocating means extends said probe to said probe sampling position, to open said probe passage inlet while said probe is in said sampling position for flow of a sample of wine from the tank into said probe inlet and through said probe passage to said probe passage sample outlet, and to then close said probe inlet while said probe is retracted, whereby said probe inlet is closed whenever said inlet moves through any sediment layer so that any sediment in the tank is prevented from entering said probe inlet.

23. A sampling apparatus as in claim 22, wherein said connecting device includes a valve operable between said open and closed states, said valve has a passage that extends between said sampler and the vessel opening when said valve is in said

open state for extension of said sampler probe through said valve passage and the tank opening to said probe sampling position, and that does not extend between said sampler and the vessel opening when said valve is in said closed state and said probe is retracted.

24. A sampling apparatus as in claim 23, wherein said connecting device valve includes a shell and a ball valve in said shell, and said ball valve has said valve passage extending therethrough and is manually rotatable to said open state where said passage extends between said sampler and the vessel opening and to said closed state where said passage does not extend between said sampler and the vessel opening.

25. A sampling apparatus as in claim 22, wherein a rearward end of said probe extends rearward out of said bore rearward opening and said means for reciprocating said probe comprises handle means attached to said probe rearward from said bore rearward opening for being manually gripped and moved to reciprocate said probe in said bore.

26. A sampling apparatus as in claim 25, including a passage in said handle means extending between said probe passage sample outlet and a sample discharge port from said handle means passage for flow of a sample of wine from the vessel into said probe inlet and through said probe passage to and through said probe sample outlet and said handle means passage to and out of said sample discharge port for collection.

27. A sampling apparatus as in claim 22, including bearing means and seal means for supporting said sampler probe for reciprocation in said sampler body bore and for sealing said probe to said bore.

28. A sampling apparatus as in claim 22, including locking means operable when said probe is in said probe sampling position for releasably locking said probe against retraction.

29. A sampling apparatus as in claim 28, wherein said locking means includes L-shaped slot means having detent means in said sampler body and lock-pin means extending from said probe for entry into said slot means and detent means when said probe is extended to said sampling position.

30. A sampling apparatus as in claim 22, wherein said means for opening and closing said probe passage inlet includes a generally cylindrical plunger extending longitudinally through said probe passage, means for reciprocating said plunger between forward and rearward positions in said probe passage, and valve means for opening and closing said probe passage inlet in response to said plunger being in respective forward and rearward positions in said probe passage.

31. A sampling apparatus as in claim 30, wherein a rearward end of said plunger extends rearward out of said probe passage rearward opening, a forward end of said plunger extends through said probe passage inlet, said reciprocating means comprises means toward a rearward end of said plunger for manually reciprocating said plunger in said probe passage, and said valve means for opening and closing said probe passage inlet comprises a valve seat on one of said probe and plunger and a valve on the other,

said valve and valve seat moving together to close said probe passage inlet when said plunger is reciprocated to its rearward position and moving apart to open said probe passage inlet when said plunger is reciprocated to its forward position.

32. A sampling apparatus as in claim 31, wherein said plunger has a forward tip extending through and out of said probe passage inlet and said tip has an enlarged forward end positioned forward from and of a greater diameter than said probe passage inlet, said valve means seat is on said probe at said probe passage inlet and said valve is on said tip, said valve moving against said seat to close said probe passage inlet when said plunger is reciprocated to its rearward position and moving away from said seat to open said probe passage inlet when said plunger is reciprocated to its forward position.

33. A sampling apparatus as in claim 30, wherein the sample of wine from the vessel interior flows into said probe inlet and around said plunger when flowing through said probe passage.

34. A sampling apparatus as in claim 30, including means for supporting said plunger for reciprocation in said probe passage and means for sealing said plunger to said probe.

35. A sampling apparatus as in claim 32, wherein said plunger is cylindrical and rearward from its forward tip is of a smaller diameter than said probe passage for flow of sampled wine through said probe passage and around said plunger, said plunger tip is generally cylindrical and extends through a reduced diameter forward probe passage portion having an inner diameter that is slightly greater than the outer diameter of said

tip for supporting said plunger tip for reciprocation therein, and including at least one longitudinally extending channel in an outer surface of said tip for accommodating a flow of wine past said tip and through said reduced diameter probe passage portion.

36. A sampling apparatus as in claim 22, further including a male and a female coupling, wherein one of said couplings is attached to said sampler body and said connecting device includes the other of said couplings, and means for releasably locking said couplings together so that said sampler may be attached to and detached from said connecting device.

37. A method of sampling a liquid product in a vessel, comprising the steps of:
coupling a sampler to an opening to the vessel with a connecting device;
establishing a path through the connecting device between the sampler and the opening to the vessel;
extending a probe of the sampler, in which probe there is an inlet, through the connecting device path and vessel opening and into the vessel to position the probe inlet in liquid product in the vessel;
closing the probe inlet during performance of said extending step;
opening the probe inlet, following performance of said extending step and while the inlet is in liquid product in the vessel, for flow of a sample of liquid product into the inlet;
retracting the probe from the vessel interior and through the vessel opening and connecting device; and
closing the probe inlet during performance of said retracting step.

38. A method as in claim 37, including the further step, following performance of said retracting step, of interrupting the path through the connecting device between the sampler and the vessel opening.

39. A method as in claim 38, including the further step, following performance of said interrupting step, of detaching the sampler from the connecting device without escape of liquid product from the vessel opening.

40. A method of obtaining samples of wine from a tank in which there is a sediment layer of the lees toward a lower end of the tank, comprising the steps of:

mounting a connecting device to the tank;

attaching a sampler to the connecting device;

establishing a path through the connecting device between the sampler and an opening to the tank;

extending a probe of the sampler having an inlet thereto, while maintaining the probe inlet closed, through the connecting device path, tank opening and sediment layer in the tank to position the probe inlet in wine in the tank inward from the sediment layer;

opening the probe inlet while the inlet is in wine in the tank inward from the sediment layer for flow of a sample of wine into the inlet;

closing the probe inlet after the sample of wine has flowed through the inlet; and

retracting the probe from the tank interior and through the sediment layer, tank opening and connecting device path while maintaining the probe inlet closed.

41. A method as in claim 40, including the step of flowing the wine sample, while the probe inlet is open, into the probe inlet and through the probe to a sample collection point beyond the connecting device.

42. A method as in claim 40, wherein said establishing, extending, retracting, opening and closing steps are manually performed.

43. A method as in claim 40, including the steps, following performance of said retracting step, of interrupting the path through the connecting device, and then detaching the sampler from the connecting device without escape of wine from the tank opening.

44. A method as in claim 40, including repeating said steps of obtaining samples of wine to obtain successive samples of wine from a series of different tanks of wine.